WIDEBAND TEST SET
HALCYON/CXR
704A 2
SHOP

MP MASTER
MA32226

OPERATION MANUAL

MODEL 704A

WIDEBAND TEST SET

CXR telcom

SECTION 2 - DESCRIPTION

2.1 704A Front Panel Controls and Indicators

The 704A front panel controls and indicators are shown in detail in figure 1. Each item is described in the following table, listed by the reference number which appears in the figure. The description is divided into five functional groups; Display, Receive, Transmit, Line Interface, and Power.

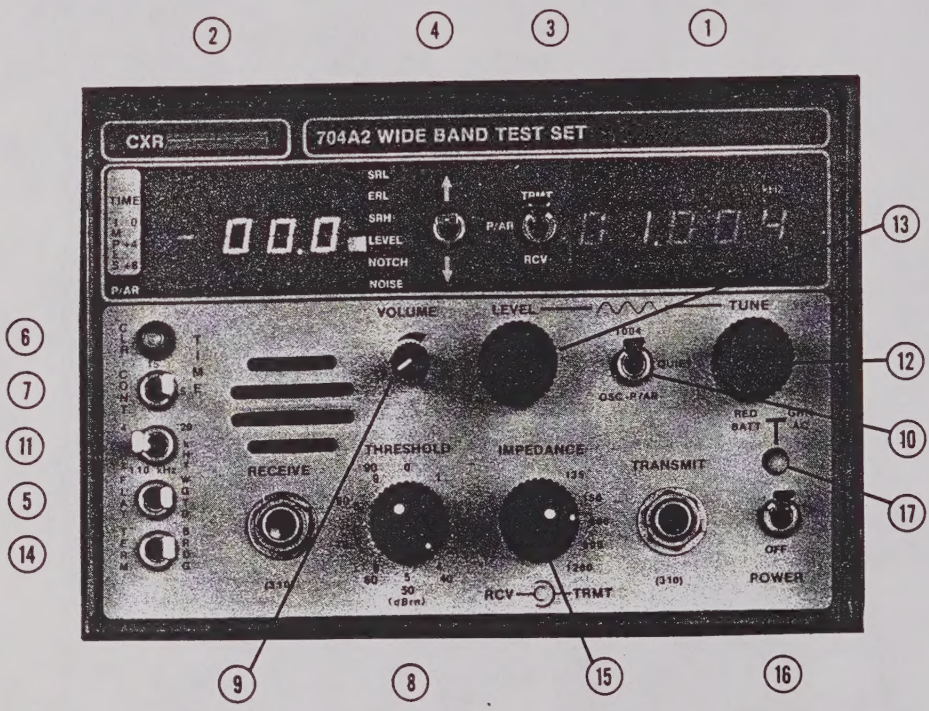


Figure 1. 704A Front Panel

Reference	Name	Function
Display		
1		**Frequency Display:** The right-hand (green) display shows frequency, in kHz. Resolution is 1 Hz to 4 kHz and 10 Hz above this value.
2		**Level Display:** The left-hand (red) display shows the value of the parameter being measured. Signal level is displayed in units of dBm, noise in dBrn, and P/AR in units. During P/AR and Return Loss testing, this display shows the measured value if the signal level is within measurement range and shows a (-) or (+) during an out-of-range condition.
3		**Display Select:** This three positon switch connects the internal measuring circuits to either the receiver (RCV) or to the transmitter (TRMT) or configures the receiver to measure P/AR. When the latter is selected, only the RCV signal can be measured.

Reference Name Function *(continued)*

4 **Function Select:** This up/down step control selects the test function of the set or the impulse noise counts to be displayed. The LED indicators in the left hand display area show the selected function, as follows;

LEVEL; An averaging detector and flat response are selected. The measured value is displayed in dBm.

NOISE; A RMS detector and a noise shaping filter are selected. The measured value is displayed in dBrn.

NOTCH NOISE; A RMS detector, a noise shaping filter, and a 1010 Hz band elimination filter are selected. The measured value is shown in dBrn.

ERL/SRL/SRH; The transmitter and receiver are both configured to make a return loss test. The position of the LED cursor indicates which transmit signal shaping filter is in use. (Applicable to 704A2 model only).

TIME; Indicates elapsed time of Impulse Noise test.

IMPLS, 0/+4/+8; These three counters show the number of impulses which have crossed the threshold setting, 4 dB above the threshold, and 8 dB above the threshold.

P/AR; The peak-to-average ratio of the received signal is measured.

Note: The displays are blanked when TRMT and either NOISE mode are selected simultaneously. This does not mute the transmitter.

Receiver

5 **Filter select:** This two position switch selects either a complex noise weighting filter (WGTD), or a simple low-pass network (FLAT). The exact form of filter selected is dependent on the position of the bandwidth select switch located above it, as follows:

4 kHz (VF); the filters are C-MESSAGE and 3-kHz FLAT respectively.
20-kHz (PROG); the filters are PROGRAM and 15-kHz FLAT.
110-kHz (WIDEBAND); the filters are 50 kb/s and 50 kHz FLAT.

6 **Clear:** Pushbutton switch resets impulse noise counters and timer to zero. The test continues to run as long as the function is selected. The red LED in the switch blinks when the test is running.

7 **Time:** The three position switch selects the duration of the impulse noise test. Continuous, 15 minute, and 5 minute selections are available.

8 **Threshold:** This dual, concentric, decade switch selects the impulse noise threshold. The outer switch has 10 dB increments, from 40 to 90 dBrn; the inner switch has 10 one dB increments for a total range of 40 to 99 dBrn.

9 **Volume:** Controls the gain of the monitor amplifier which drives the internal speaker.

Reference Name **Function** *(continued)*

Transmitter

10 **Oscillator:** Three oscillator modes are provided. The 1004 position of the switch selects a standard 1004 Hz test tone; the QUIET position mutes the transmitter but retains the line termination; the OSC-P/AR-RL mode selects a variable frequency generator, a standard P/AR signal, or the return loss signal if these functions have been selected by control 4.

11 **Bandwidth:** This switch controls the frequency range of the TUNE control and also preselects the noise filter. In the 4-kHz position, the frequency range is 50 Hz to 4 kHz; in the 20-kHz position the frequency range is 3 to 20 kHz; in the 110-kHz position the range is 15 to 110 kHz.

12 **Tune:** Continuously variable control is used to tune the generator to the desired frequency. This control is active when the oscillator control is in the OSC position and the Level function has been selected.

13 **Level:** Continuously variable control sets the generator output level.

Line Interface

14 **Receiver Termination:** Selects either a TERM or a BRDG condition for the receive line. The bridging impedance of the 704A is approximately 25k Ohms.

15 **Impedance:** Selects impedance of the receiver (inner control), and the transmitter (outer control). Selections are 135, 150, 600, 900, and 1200 Ohms.

Power

16 **Power switch:** The set is operated from AC power when the switch is in the DOWN position (green indication), and from internal batteries when in the UP position (red indication). Charging current is applied to the batteries whenever the set is plugged in.

17 **Power Indicator:** This two color LED is on whenever the set is powered up. The indication is red when batteries are in use and green when AC power is being used. A LOW BATTERY alarm is provided by flashing the red LED.

2.2 Rear Panel Description

The rear panel contains only an AC power module. This includes a fuse and a voltage selector card. The power supply is designed to operate from either 120 or 240 VAC. A 250 mA fuse is used for 115 VAC operation.

5 - SPECIFICATIONS

5.1 704A Transmission Test Set

Oscillator

Frequency	50 Hz to 110 kHz, in three ranges
	4 kHz: 50 Hz to 4 kHz
	20 kHz: 3 to 20 kHz
	110 kHz: 15 to 110 kHz
Fixed frequency	1004 Hz
Output level	-40 to +13 dBm, (+10 dBm maximum @ 1200 Ohms)
Flatness	0.1 dB; 200 to 4000 Hz
	0.2 dB; 4 to 15 kHz
	0.5 dB; 15 to 110 kHz
Distortion	<-50 dB, 300 to 3000 Hz
	<-40 dB, other frequencies

P/AR Signal Generator

Line spectrum	per section 4.6.2. of IEEE Std. 483
Output level	-40 to 0 dBm
Level resolution	1.0 dB

Return Loss Generator

Signal	shaped white noise, per IEEE Std. 483
Filters	ERL: 500 to 2500 Hz
	SRL: 250 to 500 Hz
	SRH: 2200 to 3400 Hz
Level	-10 to -2 dBm

Level/Frequency Measurement

Range	-50 to +13 dBm
	50 Hz to 110 kHz
Accuracy	0.1 dB; 1004 Hz, -19 to 0 dBm
	0.2 dB; 200 Hz to 15kHz,-30 to 0 dBm
	0.3 dB; 200 Hz to 15 kHz, -40 to +13 dBm
	0.5 dB; <200 Hz and >15 kHz
Resolution	0.1 dB
	1 Hz to 4 kHz; 10 Hz above 4 kHz
Detector	averaging

Noise Measurement

Modes	Idle line, Notched
Filters	C-Message, 3-kHz Flat; (4 kHz)
	Program, 15-kHz Flat; (15 kHz)
	50 kb/s, 50 kHz Flat; (110 kHz)
Notch filter	-50 dB, 995 to 1025 Hz
Range	10 to 99 dBrn; (idle line)
	20 to 99 dBrn; (notched)
Resolution	1 dB
Accuracy	1 dB, 20 to 90 dBrn
	2 dB, 10 to 20 dBrn
Detector	quasi-RMS

Noise-to-Ground Measurement (700A Adapter)	
Range	50 to 130 dBrn
Accuracy	1.5 dB
Impedance	100k Ohm, lead to ground
Impulse Noise Counting	
Counters	three; selectable threshold, +4 dB, +8 dB
Counter capacity	999
Threshold selection	40 to 99 dBrn
Threshold resolution	1 dB
Threshold accuracy	1 dB
Timer	5 minutes, 15 minutes, continuous
P/AR Measurement	
Range	0 to 120 units
Accuracy	2 units; 30 to 110
	4 units; 0 to 30 and 110 to 120
Resolution	1 unit
Return Loss Measurement	
Configuration	four-wire
Measurement range	0 to 50 dB
Accuracy	1 dB
Resolution	1 dB
Line Interface	
Impedance	600, 900, 135, 150, 1200 Ohms
Bridging	>20k Ohms
Balance	90 dB at 50 Hz, decreasing 20 dB per decade
Environmental	
Operate temp.	0 to 50°C
Storage temp.	-25 to +75°C
Relative humidity	0 to 90%, non-condensing
General	
Size (approx)	5" x 8.5" x 18" overall
Weight	14 lbs., with 705B
Power	115/230 VAC, 50/60 Hz
	Internal NiCd batteries
Battery cap.	3.5 hours (typical)
Recharge time	approx. 12 hours

2.0 REFERENCE DOCUMENTS

704A2

3.1 SD-0002-89

3.2 SD-0002-90

3.3 SD-0704-43

3.4 SD-0704-56

3.5 SD-0704-61

3.6 SD-0704-65

3.7 SD-0704-66

3.8 SD-0704-67

3.9 SD-0704-80

3.10 SD-0704-96

3.11 ED-0002-89

3.12 ED-0002-90

3.13 ED-0704-43

3.14 ED-0704-56

3.15 ED-0704-61

3.16 ED-0704-65

3.17 ED-0704-66

3.18 ED-0704-67

3.19 ED-0704-80

3.20 ED-0704-96

4.0 EQUIPMENT REQUIRED

4.1 (1) Multimeter. Fluke 8810 DMM or equivalent

4.2 (1) Hewlett-Packard RMS Voltmeter #3400A or equivalent.

4.3 (1) Distortion Analyzer. Sound Technology #1710A.

4.4 (1) Frequency Counter. Fluke 1900A or equivalent.

4.5 (1) Oscilloscope. Philips PM 3212 or equivalent.

4.6 (1) Attenuator. HP 350D or equivalent.

4.7 (1) DC power supply. HP 6294A or equivalent.

4.8 (1) Each 135ohms, 150ohms, 600ohms, 900ohms and 1200ohms shunt terminations.

4.9 (1) Each 135ohms, 150ohms, 600ohms, 900ohms and 1200ohms series terminations.

4.10 (1) 112B equilizer.

4.11 Power Science SPG-310 spike generator or equivalent.

4.12 Fluke 5200A programmable AC calibrator or equivalent.

5.0 SET-UP

5.1 Set as in Table 1.

5.2 TABLE 1:

5.3	Function	LEVEL
5.4	Mode Switch	REC
5.5	Impedence Swtich (receive and transmit)	600 ohms
5.6	Termination Switch	TERM
5.7	Weighting Switch	WGTD
5.8	Frequency Range	4 kHz
5.9	Time	CONT
5.10	Transmitter	OSC1

6.0 TEST - JACK CONNECTIONS

6.1 Check that the Tip and Ring of RECEIVE and TRANSMIT are not connected to ground (>DDD 20 meg. ohms).

6.2 Check that the sleeves of both jacks are connected to Analog ground (< 10 ohms).

6.3 MECHANICAL INSPECTION

6.4 Verify that all switches, and knobs function properly.

6.5 Step thru all 704A2 FUNCTIONS and verify tht the function LED's and LED display are properly aligned.

6.6 With the 704A power off, take out the (8K-0704-66) board.

6.7 Use you extender board and mount the (8K-0704-66) board on it.

6.8 Turn on Power ON.

6.9 Use your 8810A DMM and check pins for the following voltages:

- Pin 1 Ground (Analog
- Pin 2 +9VDC±5%
- Pin 3 -9VDC±5%
- Pin 4 +5VDC±5%
- Pin 5 +6.2VDC±5%
- pin 6 -6.2VDC±5%

7.0 DC BLOCKING

7.1 Set the 704A2 to BRDG.

7.2 Apply 48VCD across the RECEIVE jack. The DC current drawn must be OmA.

7.3 Apply 48VDC across the TRANSMIT jack. the DC current drawn must be OmA.

7.4 Return the 704A2 to TERM.

8.0 15 MINUTES TIMER (The following timer test maybe performed at the end of the test procedure)

8.1 Step the 704A2 function to TIME.

8.2 Clear the counters.

8.3 Set the time switch to 5.

8.4 The time LED should be on and the CLR LED should be flashing.

8.5 After 5 minutes, the CLR LED should stop flashing.

8.6 Set the time switch to 15. Clear the counter.

8.7 Verify the counter stops counting after 15 minutes.

8.8 Set the time switch to continuous. Clear the counter.

8.9 Verify the counter still counts after 15 minutes.

9.8 RECEIVE - LEVEL CALIBRATION

9.1 Apply 1KHZ and 0.0 dbm from the 1710A to the DMM 8810A and verify that the reading is .7746 AC (RMS).

9.2 Apply 1KHZ and 0.0 dbm from the 1710A to 704A2 Receiver.

9.3 Adjust R2 (8000-0002-89) for a reading of +0.0 dbm on level display.

9.4 Apply -10 db attenuation to the receiver.

9.5 Adjust R1 on the (8000-0002-89) for a reading of -10.0 dBm on the level display.

9.6 Apply -20 db attenuation to the receiver.

9.7 Adjust R4 on the (8000-0002-89) for a reading of -20.0 dBm on the level display.

9.8 Apply -30dB attenuation to the receiver.

9.9 Adjust R23 on the (8000-0002-89) for a reading of -30.0 dBm on the level display.

9.10 Apply -50 dB attenuation to the receiver.

9.11 Adjust R93 on the (8000-0002-89) for a reading of -50.0 dBm on the level display.

9.12 Repeat steps 9.1 thru 9.11 until the following conditions are met.

9.13

RMS VOLTMETER	LEVEL DISPLAY
+13.0 dBm	+13.0 ± 0.2 dBm
0.0	0.0 ± 0.1 dBm
-10.0 dBm	-10.0 ± 0.1 dBm
-20.0 dBm	-20.0 ± 0.1 dBm
-30.0 dBm	-30.0 ± 0.2 dBm
-40.0 dBm	-40.0 ± 0.2 dBm
-50.0 dBm	-50.0 ± 0.4 dBm
-60.0 dBm	-60.0 ± 0.4 dBm

9.14 Increase the 1710A output. As the output is increased, the 704A2 level display should blank out at some level between +13.0 and +15.0 dBm.

9.15 Decrease the 1710A output. The 704A2 level display should return at > +13.0 dBm.

9.16 terminate the 704A2 with 900 ohms.

9.17 Set the 5200A to 1.89737 VAC at 1KHz (900 ohms series terminated).

9.18 verify that the 704A2 display reads 0.0 dBm ± 1.

9.19 Terminate the 704A2 with 135 ohms. 2.2 dbm 2.2 ± 1

9.20 Set the 5200A to .734847 VAC (135 ohms series terminated).

9.21 Verify that the 704A2 displays reads 0.0 dBm ± 1.

9.22 Terminate the 704A2 with 150 ohms. 1.8 db.

9.23 Set the 5200A to .774597 VAC (150 ohms series terminated).

9.24 Verify that the 704A2 display reads 0.0 dBm ± 1.

9.25 Terminate the 704A2 with 1200 ohm. .5 db

9.26 Set the 5200A to 2.19089 VAC (1200 ohms series terminated).

9.27 Verify that the 704A2 display reads 0.0 dBm ± 1.

9.28 Return the 704A2 to 600 ohms termination. .00 db

9.29 Set the 5200A to 1.54919 (00.0dBm) series terminated with 600 ohms.

9.30 Select BRDG on the 704A2 and verify the level rises by 6.0dB ± 0.1

10.0 RECEIVE NOISE FLOOR

10.1 Disconnect all cables from Receive Jack.

10.2 Set the 704A2 to 4 KHz Wght and NOISE mode, 600Ω termination.

10.3 Adjust R3 on the (8000-0002-89) for a display reading of < 10 dBrn. (Ideal 08 dBrn).

10.4 Step the function to NOTCH. Display reading should read < 20 dBrn. but should be > 0 dBrn.

10.5 RECEIVE - NOISE LINEARITY

10.6 Set function to "Noise".

10.7 Apply 0.0 dBm, 1000 Hz signal from 1710A to the 704A2 Receiver.

10.8 Adjust R5 (8000-0002-89) for a reading of 90 dBrn on the level display.

10.9 Repeat step 10.2 thru 10.8 until the following conditions are met.

11.0	1710A Level	Level Display
	0.0 dBm	90 ± 1 dBrn
	-10.0 dBm	80 ± 1 dBrn
	-20.0 dBm	70 ± 1 dBrn
	-30.0 dBm	60 ± 1 dBrn
	-40.0 dBm	50 ± 1 dBrn
	-50.0 dBm	40 ± 1 dBrn
	-60.0 dBm	30 ± 1 dBrn
	-70.0 dBm	20 ± 1 dBrn

11.1 RECEIVE FREQUENCY RESPONSE

11.2 Set function to "Level".

11.3 Apply 1KHz at 0.0 dBm from 1710A to the 704A2 Receiver.

11.4 Vary the 1710A frequency from 50Hz to 110Khz. The frequency response should be as follows.

11.5	1710A Frequency (HZ)	704A Level Display (dBm)
	50	0.0 ± .5
	200	0.0 ± .2
	15K	0.0 ± .2
	110K	0.0 ± .5

11.6 Verify that 1710A output is exactl 4000Hz by using the 1900A frequency counter (period mode 250us)

11.7 When connected to the 1710A the 704A2 frequency display should measure 4000 ± 1Hz.

12.0 RECEIVE NOTCH FILTER

12.1 Step the 704A2 function to "NOTCH".

12.2 Seth the 1710A level to 0 dBm and vary the 1710A frequency form 995Khz to 1025Hz.

12.3 The 704A2 NOTCH display should read <39 dBrn for all frequencies.

12.4 Set the 1710A frequency to 1300Hz.

12.5 The 704A2 NOTCH display should read 90 ± 1dBrn.

NOTE: For new employees, if any adjustments are needed, see your supervisor.

12.6 RECEIVE NOISE WEIGHTING FILTERS

12.7 Step the 704A2 function to NOISE.

12.8 Vary the 1710A frequency and 704A2 noise filter switches to verify the following NOISE measurements.

1710a Frequency	4Khz/ WGTD (dBrn)	4Khz/ FLAT (dBrn)	20Khz/ WGTD (dBrn)	20Khz/ FLAT (dBrn)	110Khz WGTD (dBrn)	110Khz FLAT (dBrn)
45Hz					87 ± 3	
200Hz	65 ± 2					
400Hz	78 ± 1	90 ± 1	81 ± 2	90 ± 1		
1000Hz		90 ± 1	90 ± 1	90 ± 1	90 ± 1	90 ± 1
3000Hz	87 ± 1	87 ± 2	96 ± 2			
4000Hz	75 ± 2					
6000Hz		78 ± 2				
8KHz			94 ± 4			
10KHz			82 ± 4			
10.05KHz				89 ± 1		
15KHz			68 ± 4	87 ± 2		
28KHz					87 ± 3	
35KHz					85 ± 2	
50.5KHz						87 ± 1
55KHz					<60	

13.0 DISTORTION CALIBRATION

13.1 Set up.

13.2 Set as in Table #2.

13.3 TABLE #2.

13.4 Function switch level.
13.5 Function switch osc.
13.6 Mode switch 600 ohms, 4KHz mode.
13.7 THE remaining switches, set them to the left side.

13.8 Connect 704A2 transmit output to the 1710A input with a 600 shunt termination.

13.9 Turn tone frequency pot (CCW) for 50 Hz. If you can't turn the frequency below 50Hz, adjust R2 on the (8K-0704-66) board.

13.10 Tune frequency pot to 50Hz.

13.11 Adjust R2 on the (8K-0704-66) board for a distortion reading of <-40db.

13.12 Tune frequency pot to 1000Hz.

13.13 Adjust R3, on the (8K-0704-66) board, for a distortion reading of <-50dbm.

13.14 Tune frequency pot to 3000Hz.

13.15 Adjust R1 on the (8K-0704-66) board, for a distortion reading of <-50dbm.

13.16 If you can't meet Table #3 specifications, repeat steps 13.7 thru 13.14.

13.17 TABLE #3

13.18 Measure THD for the frequencies listed below

Range	Frequency (Hz)	THD (Dbm)
	50	<-40
	300	<-50
4Khz	1000	<-50
Mode	1004	<-60
	3000	<-50
20Khz	4K	<-40
Mode	20K	<-40
110Khz	20K	<-40
Mode	85K	<-40
	110K	<-40

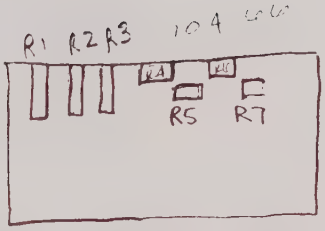
TRANSMIT SECTION

14.0 Set up.

14.1 Set as in Table #4.

14.2 TABLE #4

14.3 Function switch level.
14.4 Function switch osc.
14.5 Rotary mode switch 600 ohms, 4Khz mode.
14.6 The remaining switches, set them to the left side.



14.7 TRANSMIT LEVEL CALIBRATION

14.8 Connect the output of the 704A2 to the 8810A DMM with 600 ohms shunt termination.

14.9 Tune the VCO to about 1 Khz.

14.10 Adjust the front panel level pot to make the level display just change from -0.0 to +0.0.

14.11 Adjust R5 on the (8K-0704-66) for 0.7746 vac into 600 ohms.

14.12 Switch from the vco over to the 1004Hz tone.

14.13 Adjust R4 on the (8K-0704-66) so that the level display just changes from -0.0 to +0.0.

14.14 Adjust R6 on the (8K-0704-66) for 0.7746 vac into 600 ohms.

14.15 Switch from the 1004 tone back to the vco.

14.16 Select the 110 KHz range.

14.17 Tune to 110 KHz.

14.18 Adjust the level pot to make the display just change from -0.0 to +0.0.

14.19 Adjust R7 to 0.7746 vac.

14.20 If you can't get the level down to 0.7746 vac with R7 fully counterclockwise, you'll have to select C10.

14.21 To select C10, try for the smallest value mica capacitor that will give a 110 Khz transmit level less than 0.7746 vac with R7 fully counterclockwise. DO NOT SOLDER NOW - WAIT UNTIL THE WHOLE TEST IS FINISHED, AND EVERYTHING ON THE BOARD IS WORKING CORRECTLY.

14.22 Adjust R7 for 0.7746 vac.

14.23 Tune to 10 KHz (on the 110 Khz range).

14.24 Set the transmitter to 135 ohms impedence.

14.25 Adjust the front panel level pot to make the display just change from -0.0 to +0.0.

14.26 The transmitter level into a 135 ohms load should measure between 0.359 and 0.376 vac. (-0.2 to +0.2 DBm 135)

14.27 Tune the transmitter to 110 Khz.

14.28 The level display probably will be between 0.0 and -0.2Db, (because of the roll off).

14.29 Adjust the front panel level pot to make the level display jsut change from -0.0 to +0.0.

14.30 The transmitter level into a 135 ohms load should be between 0.347 and 0.389 vac. (-0.5 to +0.5 dBm/135)

14.31 If the level is OK go to step 14.34.

14.32 FAILURE: If the level measures less than 0.347 vac, it may have to be replaced, and the board calibration redone from step 14.9.

14.33 If the level measures more than 0.389 vac, try a 10 pf to 22 pf capacitor at C9. Use the smallest value to cap that will get the transmitter level under 0.389 vac. DO NOT SOLDER C9 NOW - WAIT UNTIL THE TEST IS FINISHED.

14.34 Select 150 ohms transmitter impedence. The signal measured into a 150 ohms load should be between 0.366 and 0.410 vac. (± .5db)

14.35 Select 600 ohms transmitter impedence. The signal level measured into a 600 homs load should be between 0.731 and 0.828 vac. (± .5db)

14.36 Select 900 ohms transmitter impedence. The signal level measured into a 900 ohms load should be between 0.896 and 1.005 vac. (± .5db)

14.37 Select 1200 ohms transmitter impedence. The signal level measured into a 1200 ohms load should be between 1.034 and 1.160 vac. (± .5db)

14.38 Return 704A2 to 4Khz mode and 600 ohms transmitter impedence. Be sure the capacitor(s) are now soldered.

15.0 IMPULSE HITS MEASUREMENT

15.1 Loopbeck the 704A2 TRANSMIT to RECEIVE.

15.2 Set the frequency switch to 1004Hz mode and Rec. mode.

15.3 Step the 704A2 functoin to LEVEL and adjust the level pot so that the display reads 0.0dB.

15.4 Connect the 1710A output to the 704A2 RECEIVE. BRDG the 704A at 600 ohms. Set the 1710A frequency to 1700Hz.

15.5 Set the 704A2 function to NOTCH. Adjust the 1710A generator level until the 704A2 notch reading just flips from 84dBrn to 85dBrn. Record the 1710A generator level setting.

15.6 Step the 704A2 to IMPLS 0. Verify that the IMPLS 0 LED is on. Set the 704A2 THRESHOLD to 88dBrn.

15.7 Adjust the 1710A generator level until the 704A2 just starts counting impulse 0 hits. Verify that the required 1710A level is within ± 1dB of the level recorded in paragraph 15.5.

15.8 Step the 704A2 IMPLS +4. Verify that the IMPLS +4 LED is on. Set the THRESHOLD to 84dBrn.

15.9 Adjust the 1710A generator level until the 704A2 just starts counting impulse +4 hits. Verify that the required 1710A level is within ± 1.0dB of the level recorded in paragraph 15.5.

15.10 Step the 704A2 to IMPLS +8. Verify that the IMPLS +8 LED is on. Set the THRESHOLD to 80dBrn.

15.11 Adjust the 1710A 'generator level unitl the 704A2 just starts counting impulse +8 hits. Verify that the required 1710A level is within +1.0dB of the level recorded in paragraph 15.5.

15.12 Repeat steps 15.7 thru 15.11 and verify the IMP 0 and +4 and +8 IMP hits are counting without further adjustments.

15.13 Disconnect the 704A2 from the 1710A.

NOTE: If impulse "0", "+4" and impulse "+8" does not count, adjust R4 on the (8K-0704-61) board (front panel board).

15.14 In steps 15.5 thru 15.11, when doing IMP hits test, you must check that IMP hits stop counting within 1dB of the reference level on your 1710A.

16.0 P/AR

16.1 Shunt terminate the 3400A with 600 ohm.

16.2 Connect the 704A2 transmit to the 3400A.

16.3 Verify the transmit level at the following levels (Example: Set the 704A2 to display -39/-40 then slightly turn to -40dBm. This will give you a -40.0 reading.

	LEVEL OUT (dBm)	3400A (dBm)
16.4	+/-00.0	-00.0 ± 1.0
16.5	-20.0	-20.0 ± 1.0
16.6	-40.0	-40.0 ± 1.0

16.7 Disconnect all cords from the 704A2.

16.8 Loopback the 704A2 transmit to RECEIVE. Change to PAR mode.

16.9 Verify the 704A2 P/AR measurements at the following levels:

	LEVEL OUT (dBm)	704A2 P/AR (dBm)
16.10	-00.0	100 ± 2
16.11	-20.00	100 ± 2
16.12	-40.0	100 ± 2

16.13 Return the 704A2 to 00.0dBm, disconnect the 704A2 loopback.

16.14 Connect the 704A2 transmit to the input of the HP3500.

16.15 Connect the HP350D (or equivalent attenuator) output to the 704A2 receive.

16.16 Vary the HP350D (or equivalent attenuator) attenuation and verify the 704A2 RECEIVE level.

	350D (dBm)	Spec (dBm)
16.17	-00.00	-00.0 ± 1.00
16.18	-20.0	-20.0 ± 1.00
16.19	-40.0	-40.0 ± 1.00

16.20 Vary the HP350D attenuation until the 704A2 PAR display blanks (out of range indication). Verify the level is <-40dBm.

16.21 Disconnect all Patch Cords from the 704A2 and return output level to -00.0dBm.

17.0 RETURN LOSS TEST

17.1 Connect the 704A2 TRANSMIT to the HP3400A, 600 ohm shunt termination.

17.2 Set the 704A2 to TRANSMIT SRL. Turn up the speaker volume and verify tha a low frequency white noise signal is heard.

110.17.3 Set the level to -2dBm and verify the HP3400 average reading reads -2.dBm ± .5.

17.4 Set the 704A2 to ERL and veriffy a mid-frequency white noise signal is heard.

17.5 Set the level to -2dBm and verify the HP3400A average reading reads -2.0dBm ± 0.5.

17.6 Set the 704A2 to SRH and verify a high frequency white noise signal is heard.

17.7 Set the level to -2dBm and verify that the HP3400A average reading reads -2.0dBm ± 0.5.

17.8 Disconnect the 704A2 from the HP3400A and connect the transmit to the input of the HP350D. Connect the output to the 704A2 RECEIVE.

17.9 Set the TRANSMIT level to -5dBm and select RECEIVE on the 704A2.

17.10 Verify the following peak readings for SRL, ERL, and SRH:

HP3500 Setting	SRL	ERL	SRH	Spec
10	10	10	10	10 ± 2.0
30	30	30	30	30 ± 2.0
40	40	40	40	40 ± 2.0
50	50	50	50	50 ± 2.0

NOTE: Shielded adequately grounded cables are required for the 50db Return Loss Measurement.

18.0 POWER-LINE NOISE IMMUNITY TEST

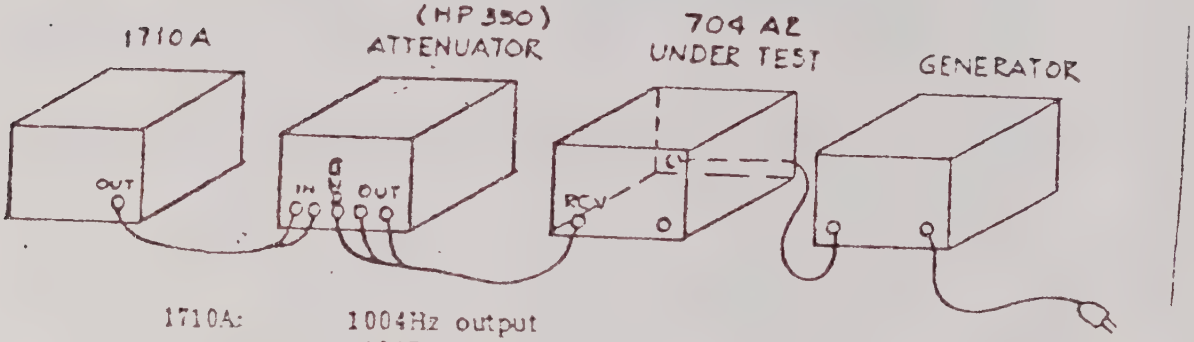
18.1 Equipment required:

(1) Sound Technology 1710A Distortion Measurement System or equivalent.

(1) Hewlit-Packard 3500 Attenuator Set

(1) Power-Science SPG-310 Spike Generator

(1) 704A2 unit under test



1710A: 1004Hz output
+10dBm
600ohm source

Attenuator: 30dB

Generator: 600 volts peak

704A: 600ohm terminated
Impulse: 40dBrn

18.3 Vary the 704A2 switches as follows:

At Impulse

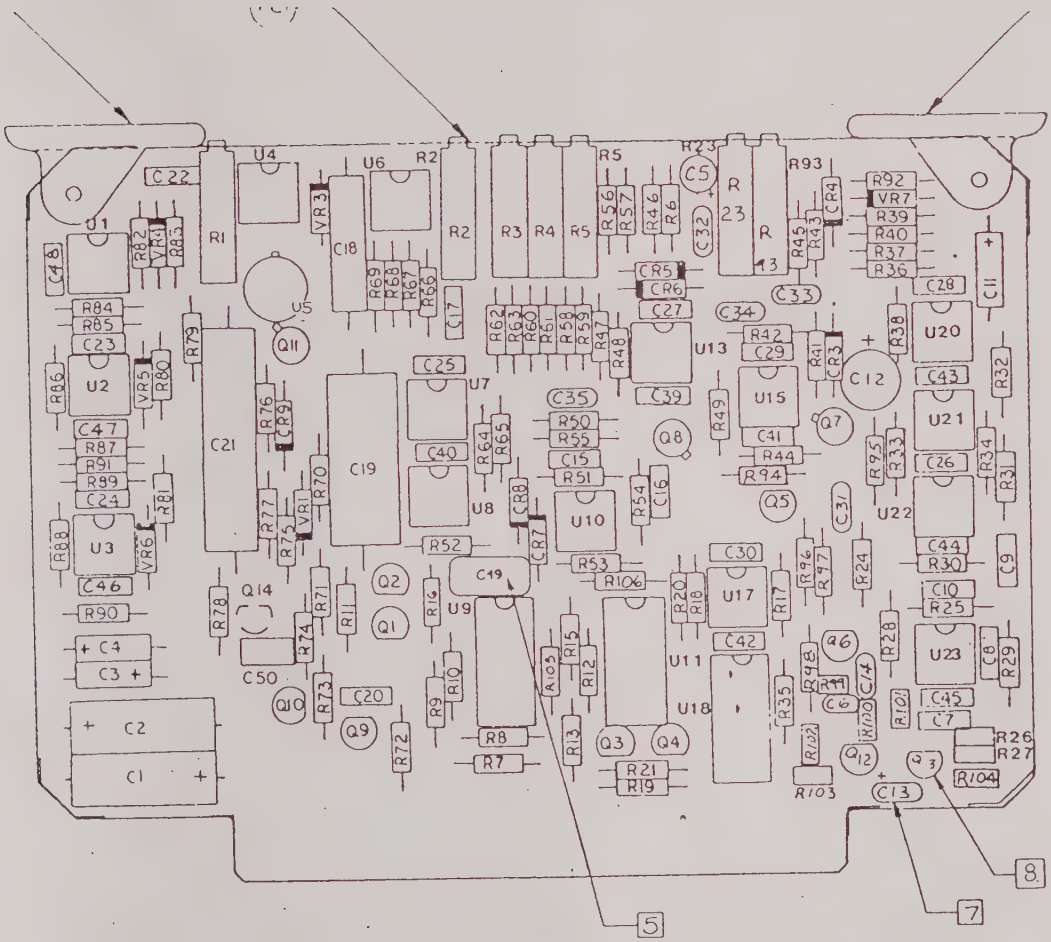
0, +4, 8 Flat: 4Khz, 110Khz, 20Khz
Weighted: 4Khz, 110Khz, 20Khz

18.4 Under these conditions, the 704A2 should not count any impulse hits except the few counts that occur during the toggle switching of the filter and frequency mode.

19.0 END OF CALIBRATION TEST

ED-0002-89 | J1

ZONE	REV	DESCRIPTION		DATE	APPROVED
	E	REV PER ECO#01077		1-25-80	JYJ
	F	REVISE PER ECO#1535		3-23-82	
	G	REVISED PER ECO#1608		9-28-82	JPH
	H	REWORK PER ECO#1691	MP	5-4-83	
	J	REVISE PER ECO# 1702	DW	5-20-83	
	J1	REVISED PER ECO# 2259		6-24-85	



COMPONENTS

.70
MAX.HEIGHT

NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

CONTRACT NO.

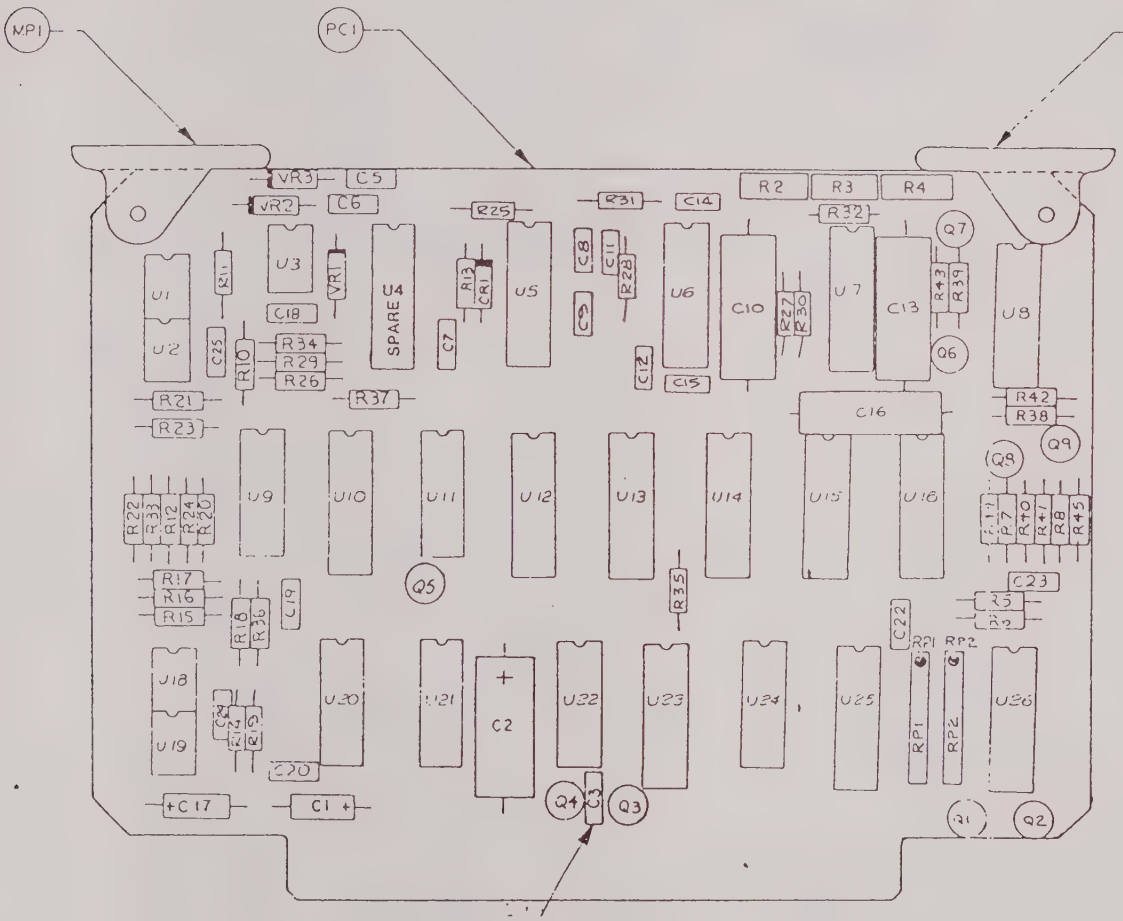
	APPROVALS	DATE
DRAWN		1-25-80
CHECKED	JOSEPH JEW	1-25-80
ISSUED		1-31-82
		4-5-82

P.C.B. ASSEMBLY
ANALOG MEASUREMENTS
(704A)

SIZE | SCM NO | DWG NO. | REV
D | ED-0002-89 | J1

SCALE 2:1 | STOCK AS:8000 | SHEET 1 OF 1

ZONE	REV	DESCRIPTION	BY	DATE	APPROVED
	D	REVISED PER ECO #1517	[illegible]	4-14-82	
	E	SKIPPED PER ECO #1649	MT	1-26-83	
	F	REVISED PER ECO #1649	MT	1-26-83	
	G	REVISED PER ECO #1692	MP	5-12-83	



COMPONENTS

NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
PARTS LIST	

CONTRACT NO	
APPROVALS	DATE
W. Thompson	4-14-82
[illegible]	5-2-82
D. Copeland	5/6/82
[illegible]	5-5-82

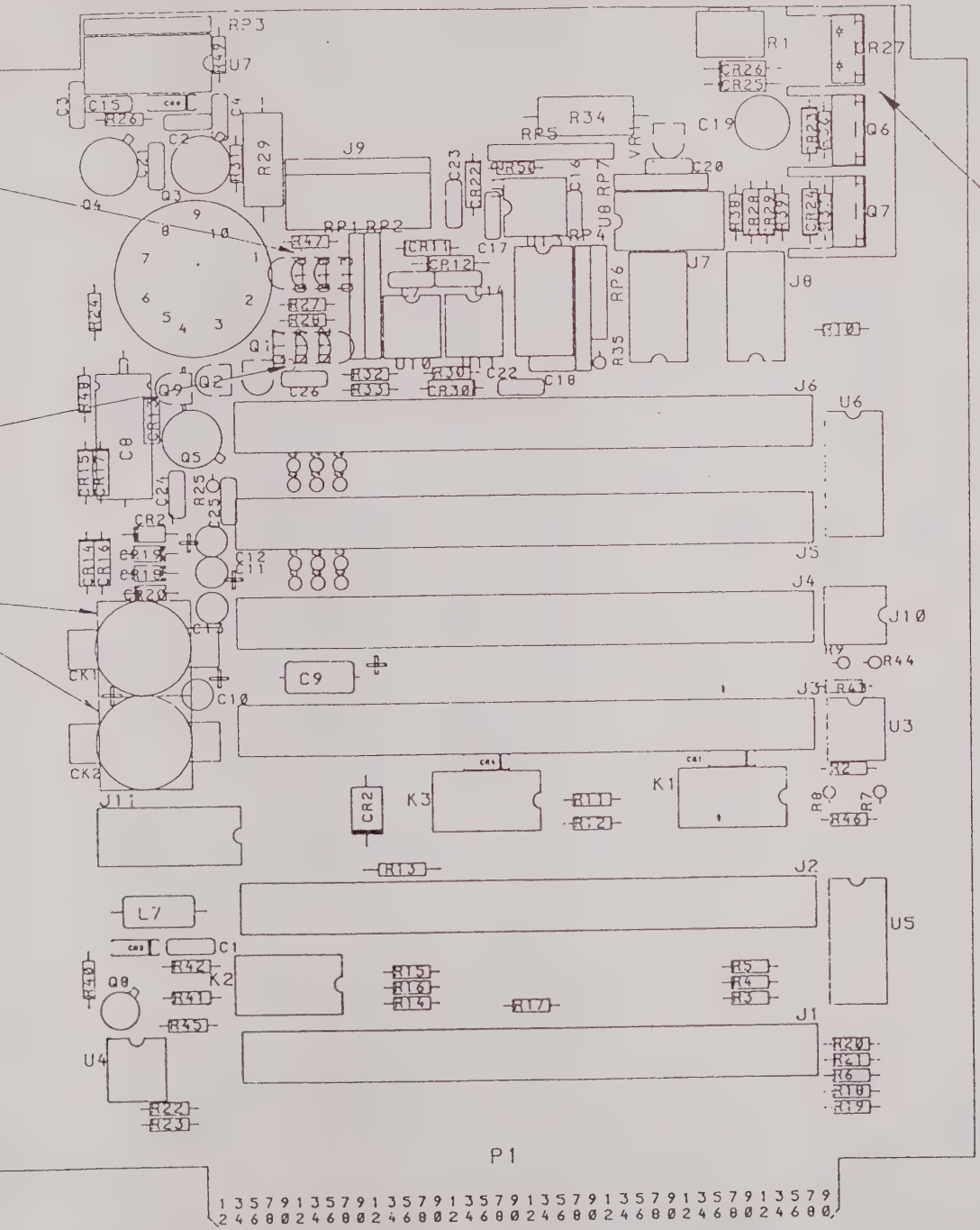
P.C.B. ASSEMBLY

IMPULSE BOARD - 704 A

SIZE	DWG NO	REV
D	ED-0002-90	G

SCALE 2:1 STOCK AS 8000 SHEET 1 OF 1

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	B	REVISION PER ECO #1723	7-83	
	B1	REVISED PER ECO # 1781	10-21 83	



NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

PART NO.	APPROVALS	DATE
	M KAIN	7/83
DRAWN		8/31/83
CHECKED		9-21-83
ENGR		
MANAGER		

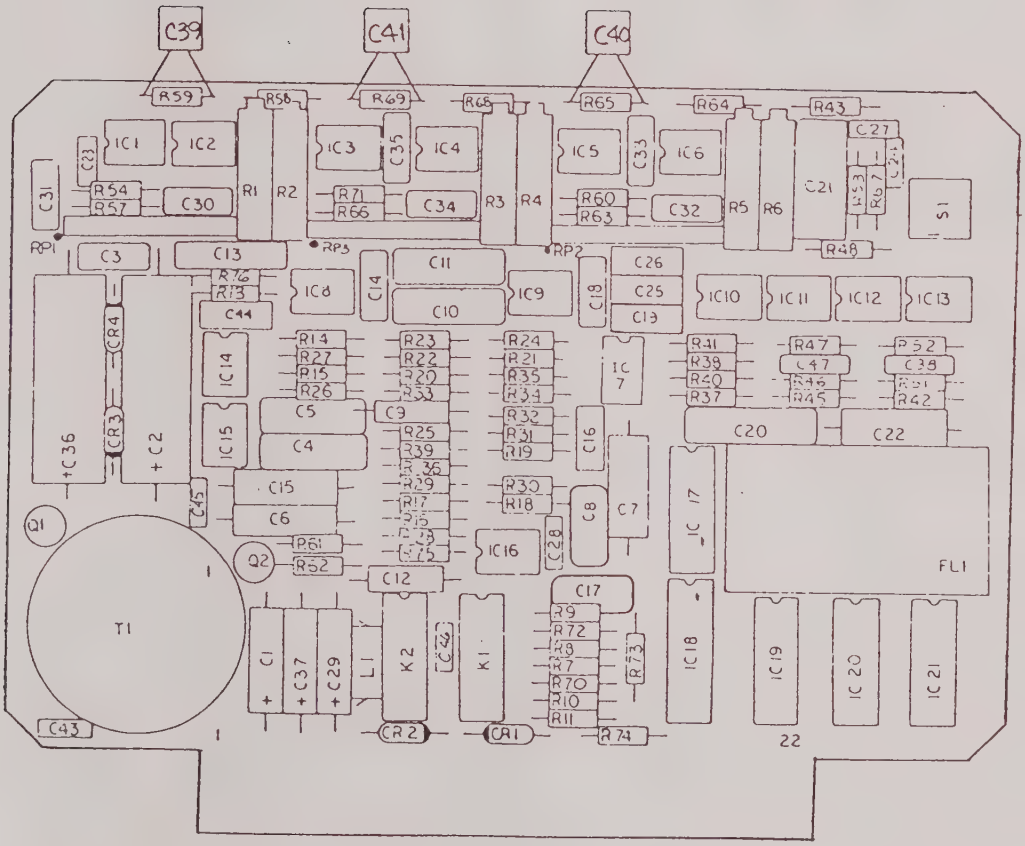
HALCYON INC.
A TOKOTEL COMPANY
2121 ZANKER ROAD
SAN JOSE, CALIFORNIA 95131

PCB ASSEMBLY
704A2 MOTHER BOARD

SIZE	FSCM NO	DWG NO	REV
D		ED-0704-46	B1

SCALE 2/1 STOCK AS 8000 SHEET 1 OF 2

REVISIONS		
ESCRIPTION	DATE	APPROVED
Γ 1		



URE TION	MATERIAL SPECIFICATION	

HALCYON

2121 ZANKER ROAD
SAN JOSE, CALIFORNIA 95131

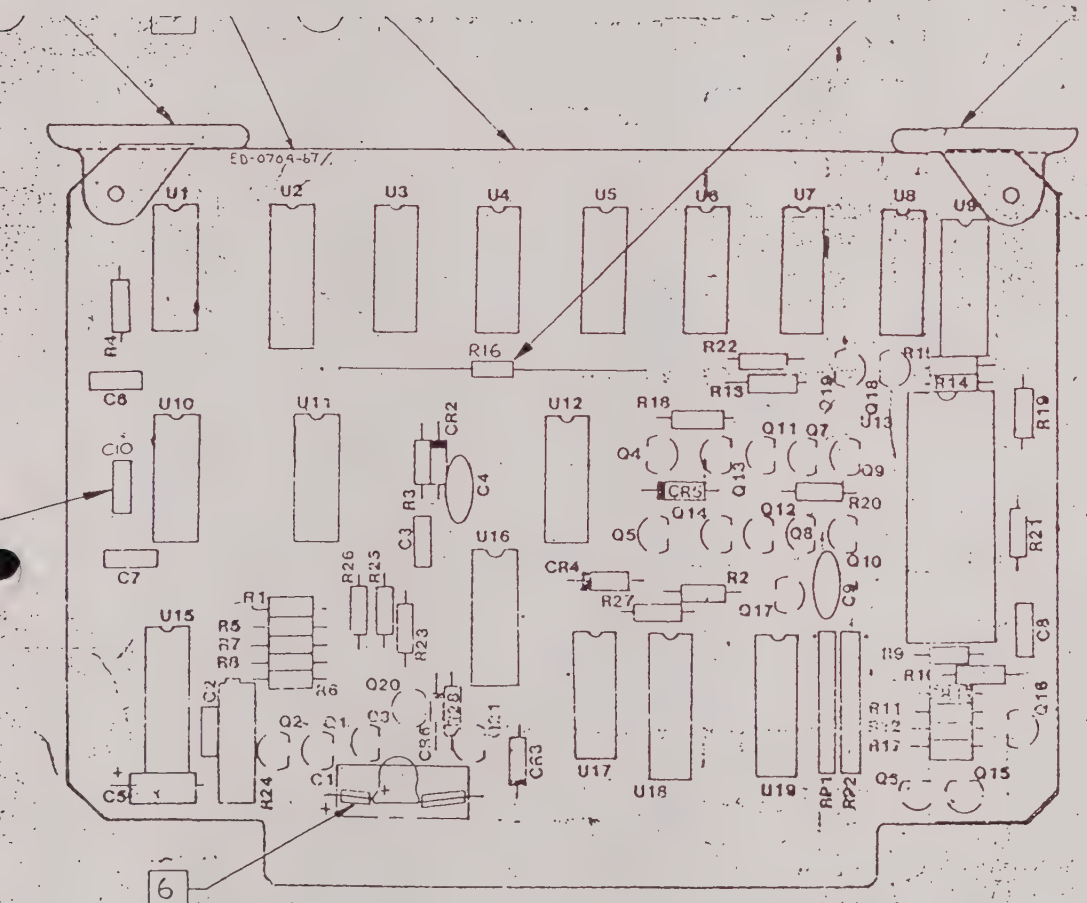
PCB ASSEMBLY
RECEIVE BOARD- 704A2

M NO.	DWG. NO.	REV.
	ED-0704-65	B1
	SHEET 3 OF 3	

ED-0704-67		I	D

REVISIONS

ZONE	REV	DESCRIPTION	DATE	APPROVED
—	A	RELEASED PER ECO #1697	6-16-83	
—	B	REVISED PER ECO #1961	6-7-84	
—	C	REVISED PER ECO# 2186	3-6-85	
—	D	REVISED PER ECO# 2408	2-25-86	



PARTS LIST

NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

CONTRACT NO.		
APPROVALS		DATE
DRAWN	N. THOMPSON	6-16-83
CHECKED		6-23-83
ISSUED		6/24/83

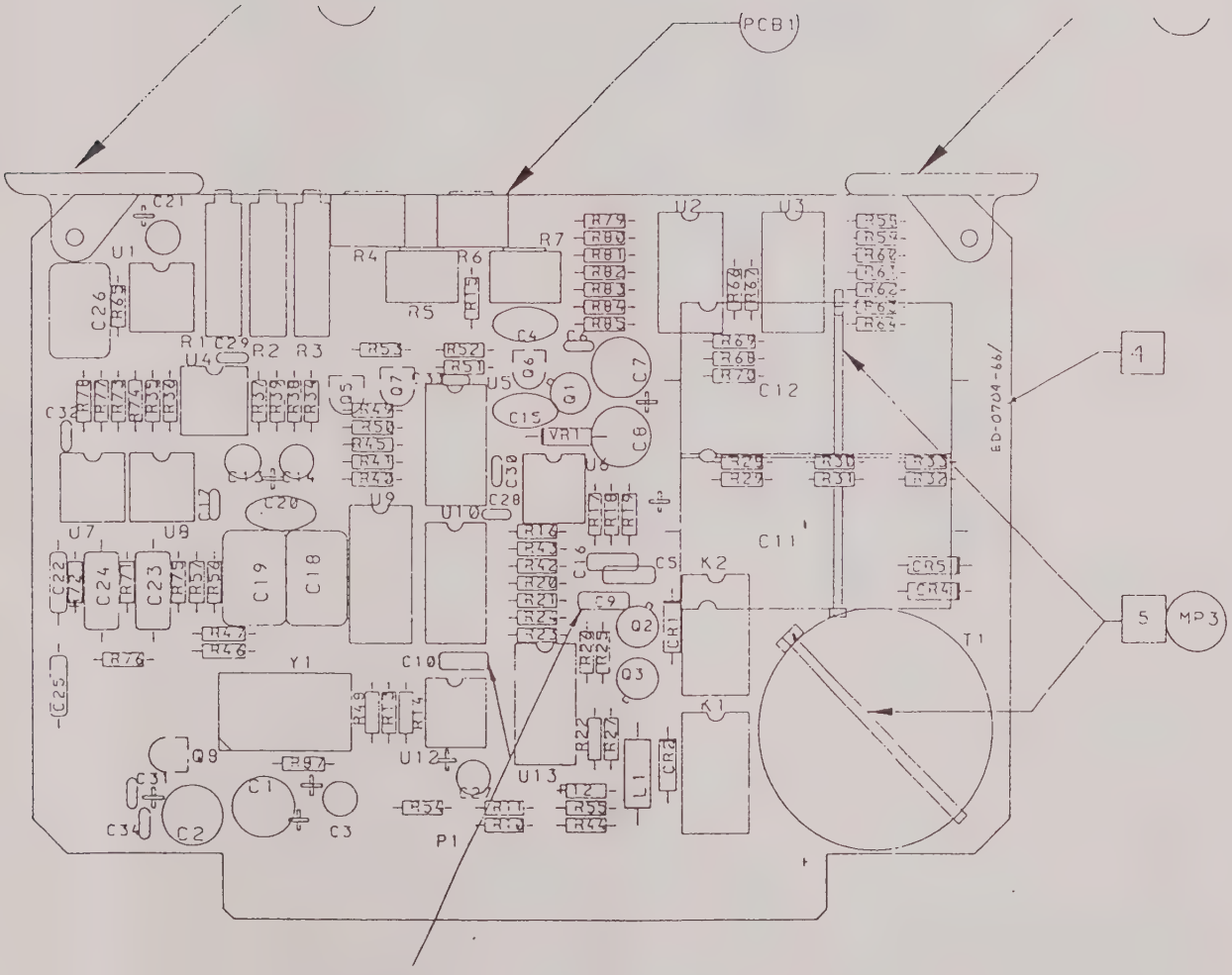
P.C.B. ASSEMBLY
DIGITAL CONTROL BD.
7042

SIZE	FSCM NO.	DWG. NO.	REV
D		ED-0704-67	D

DWG. NO.	SH.	REV.
ED-0704-66	1	A1

REVISIONS

ZONE	REV.	DESCRIPTIONS	DATE	APPROVED
—	A	PROD REL PER ECO # 1693	6-15-83	
—	A1	REVISED PER ECO=1986	6-28-84	



NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION

PARTS LIST

PART NO.	APPROVALS	DATE
	N WHITE	6-17-83
		6-21-83
		6-22-83
		6-23-83

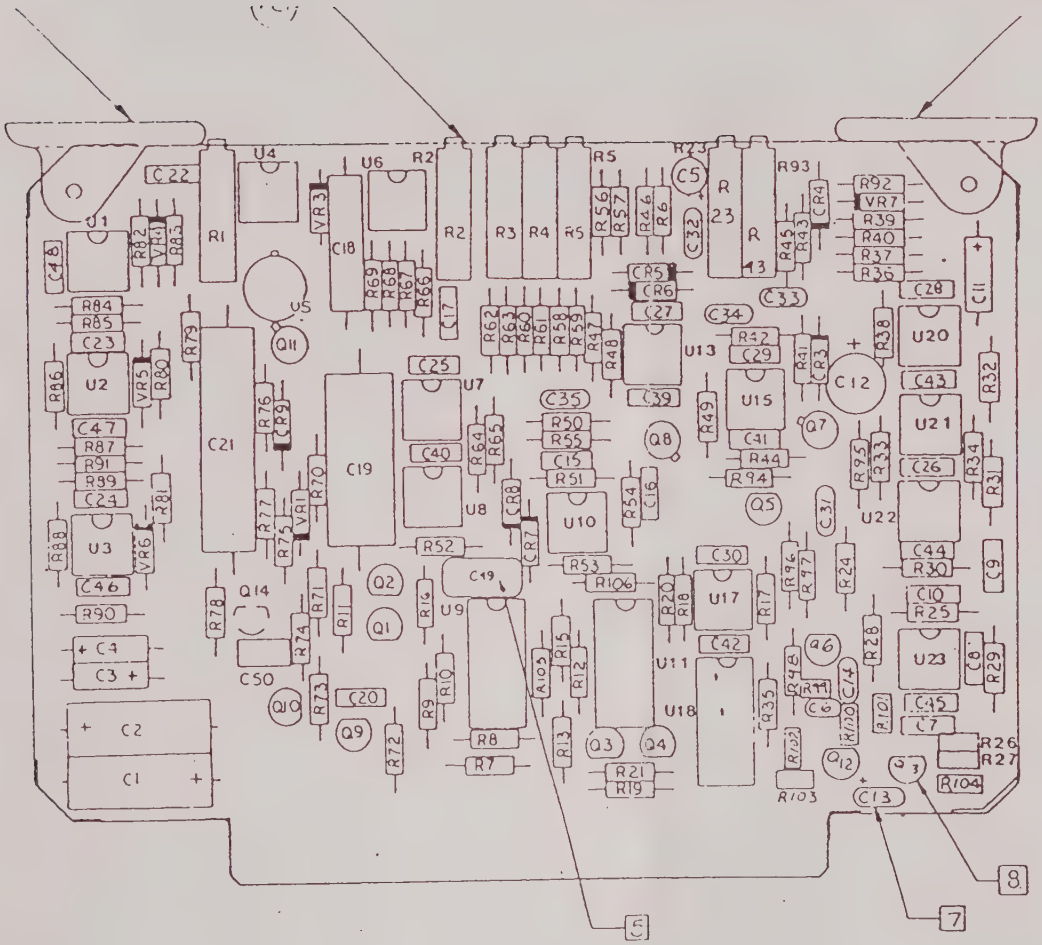
HALCYON INC.
A TORQUEL COMPANY
2121 ZANKER ROAD
SAN JOSE, CALIFORNIA 95131

PCB ASSEMBLY
TRANSMITTER BOARD
MODEL 704A

SIZE	FSCM NO	DWG NO	REV
D		ED-0704-66	A1

SCALE 2/1 SHEET 1 OF 3

ZONE	REV	DESCRIPTION		DATE	APPROVED
	E	REV PER ECO #01077		1-25-80	JYJ
	F	REVISE PER ECO #1535		3-23-82	
	G	REVISED PER ECO #1608		9-28-82	JPH
	H	REWORK PER ECO #1691	MP	5-4-83	
	J	REVISE PER ECO # 1702	DW	5-20-83	
	J1	REVISED PER ECO # 2259		6-24-85	



COMPONENTS

.70
MAX.HEIGHT

NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
PARTS LIST	

CONTRACT NO.

APPROVALS	DATE
	1-25-80
JOSEPH JEW	1-25-80
	1-31-83
	4-5-82

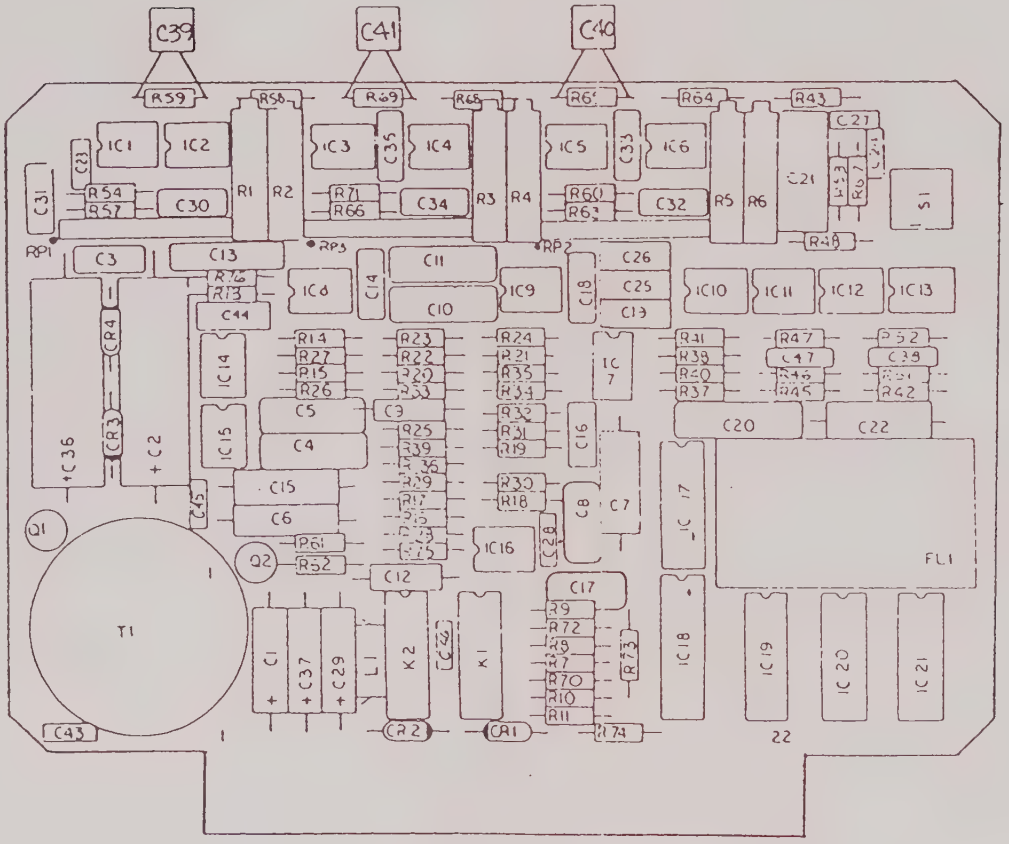
P.C.B. ASSEMBLY
ANALOG MEASUREMENTS
(704A)

SIZE | SCH NO | DWG NO. | REV
D | | ED-0002-89 | J1

SCALE 2:1 | STOCK AS:8000 | SHEET 1 OF 1

REVISIONS

DESCRIPTION	DATE	APPROVED
1		



URE ION	MATERIAL SPECIFICATION	

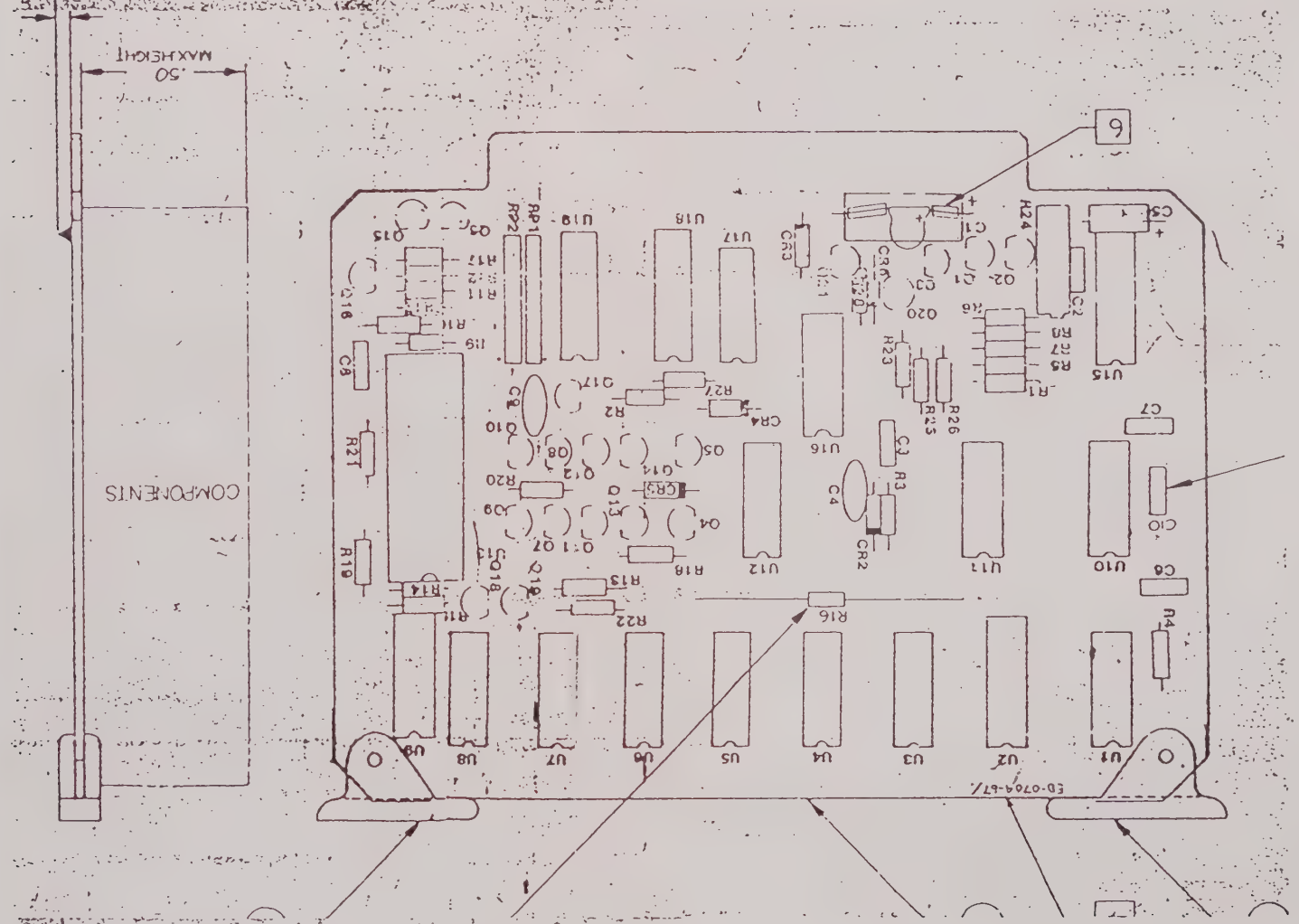
HALCYON

2121 ZANKER ROAD
SAN JOSE, CALIFORNIA 95131

PCB ASSEMBLY
RECEIVE BOARD- 704A2

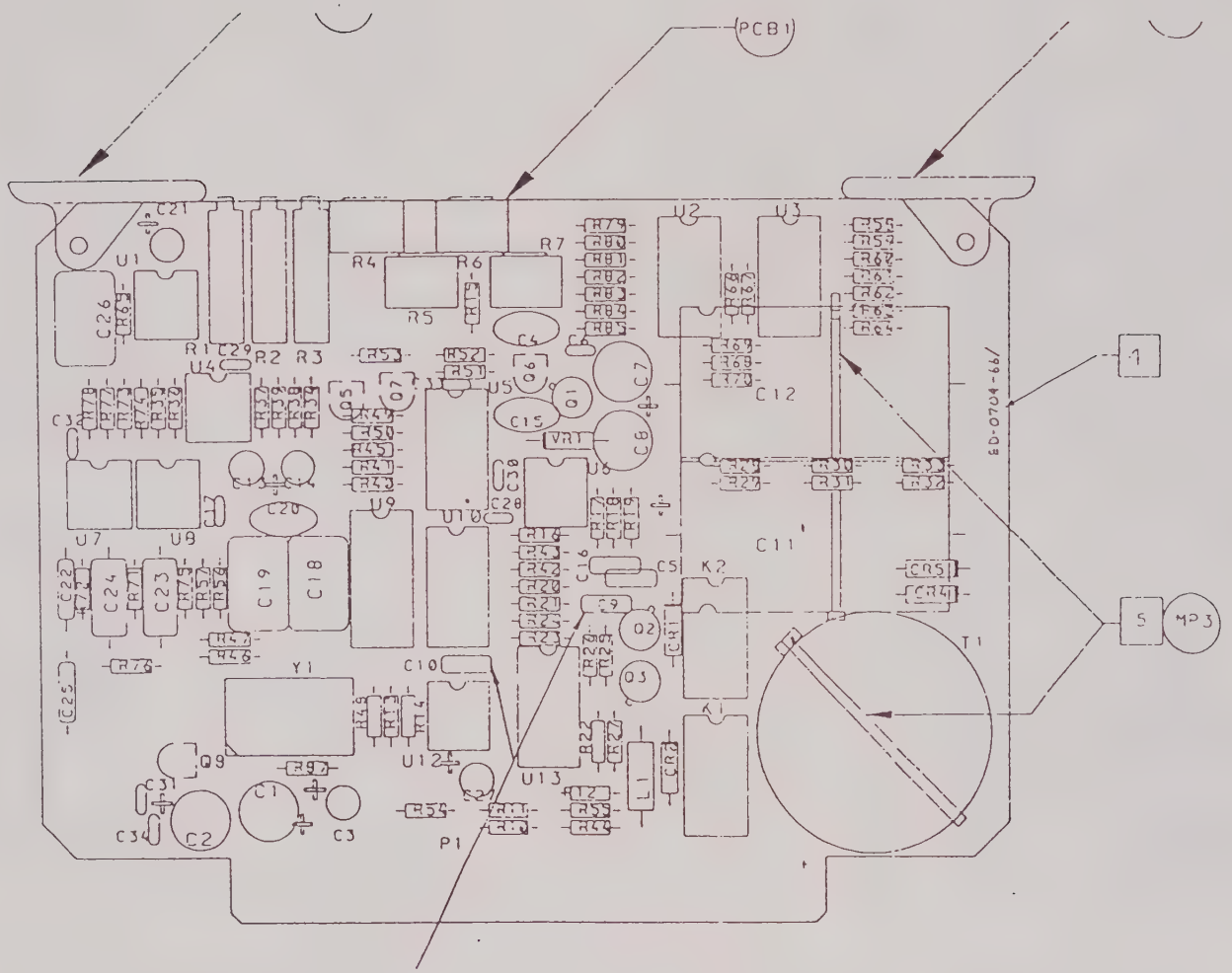
M NO.	DWG. NO.	REV.
	ED-0704-65	B1
	SHEET 3 OF 3	

		P.C.B. ASSEMBLY	
		DIGITAL CONTROL BD	
		10482	
		ED-0704-67	D



ZONE	REV	DESCRIPTION	DATE	APPVD
—	D	REVISED PER ECO# 2408	2-25-92	
—	C	REVISED PER ECO# 2186	3-6-91	
—	B	REVISED PER ECO #1961	6-7-84	
—	A	RELEASED PER ECO #1697	6-16-83	

ZONE	REV.	DESCRIPTIONS	DATE	APPROVED
—	A	PROD REL PER ECO # 1693	6-15-83	
—	A1	REVISED PER ECO=1986	6-20-84	



NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
PARTS LIST	

PART NO.	APPROVALS	DATE
	N WHITE	6-17-83
		6-21-83
		6-22-83
		6-22-83
		6-23-83

HALCYON INC.
A TORTEL COMPANY
8121 FRANCES ROAD
SAN JOSE, CALIFORNIA 95131

PCB ASSEMBLY
TRANSMITTER BOARD
MODEL 704A

SIZE	DWG NO	REV
D	ED-0704-66	A1

SCALE 2/1 SHEET 1 OF 3

A

D

2 1

CORRECTIVE ACTION REQUEST

11-19-87

NO. CAR-0002

MANUFACTURER CO Wavetek	TECH NO# 112	DATE 9/14/89
MODEL 701A & 704 & 704A2	JOB TICKET NO#	
DESCRIPTION Transmission Test Set	BAR CODE/SER#	
REPLY DUE DATE	TO (ORGANIZATION NAME.ADDRESS.PHONE NO.)	
REPLY DATE	FROM	

DESCRIPTION OF CONDITION

Input Termination not being Oliected at Calibration

CAUSE

ACTION TAKEN TO PREVENT RECURRENCE Loop Transmit to Recieve. Send 1004 Hz at 0.00db. Recieve Should Read 0.00db in all Termination positions. Switch to bridge and make sure there is a 6.0 db rise in level reading.

NOTES

SIGNATURE Richard Schutz | TITLE Equipment Repair Tech

QC approved

QA5

CORRECTIVE ACTION REQUEST

11-19-87

NO. CAR-0023

MANUFACTURER CO: HALCYON	TECH NO# 111	DATE 9-5-90
MODEL: 704A2	JOB TICKET NO#	
DESCRIPTION: TRANSMISSION SET	BAR CODE/SER#	
REPLY DUE DATE:	TO (ORGANIZATION NAME.ADDRESS.PHONE NO.)	
REPLY DATE:	FROM	

DESCRIPTION OF CONDITION: HI-FREQ ROLL OFF ABOVE 85KHZ ON RECEIVE

CAUSE: DESIGN PROBLEM

ACTION TAKEN TO PREVENT RECURRENCE: CHANGE "RECEIVE FREQ RESPONSE" PROCEDURE STEP 11.5 TO READ:

1710A FREQUENCY (HZ)	704A LEVEL DISPLAY (dBm)
50	0.0 ± .5
200	0.0 ± .2
15K	0.0 ± .2
85K	0.0 ± .5
110K	0.0 ± 1.0

NOTES: Approved QC

SIGNATURE: [signature] TITLE: Inspector QC

QA3

CORRECTIVE ACTION REQUEST

11-19-87

NO. 033

MANUFACTURER CO CXR HALCYON	TECH NO# 111	DATE 10-18-90
MODEL 704A2	JOB TICKET NO#	
	BAR CODE/SER#	
DESCRIPTION TIMS	TO (ORGANIZATION NAME.ADDRESS.PHONE NO.)	
REPLY DUE DATE	FROM	
REPLY DATE		

DESCRIPTION OF CONDITION ON SOME 704A2'S, THE IMPULSE HITS DISPLAY REMAINS BLANK UNTIL THE "CLR" BUTTON IS DEPRESSED

CAUSE VARIATIONS CAUSED BY ASSORTED REVISIONS; DOES NOT CHANGE SPECIFICATIONS

ACTION TAKEN TO PREVENT RECURRENCE INSERT ADDITIONAL STEP IN "IMPULSE HITS MEASUREMENT" PROCEDURE:

15.6.A; IF NECESSARY, DEPRESS THE "CLR" BUTTON TO OBTAIN A DISPLAY.

NOTES

Accepted

SIGNATURE [signature] TITLE Engineer - R&C

ACCOPRESS®

25970	YELLOW
25971	BLACK
25972	LIGHT BLUE
25973	DARK BLUE
25974	LIGHT GRAY
25975	LIGHT GREEN
25976	DARK GREEN
25977	TANGERINE
25978	RED
25979	EXECUTIVE RED

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